MEMORANDUM TO FILE: Motorola 52nd Street Superfund Site November 2012

Interim Action Level – Residential Indoor Air Inhalation Exposures to TCE (Trichloroethylene)

As the vapor intrusion investigation at Operable Unit 1 of the Motorola 52nd Street Superfund Site (Site) moves into the mitigation phase, it is necessary to establish an Interim Action Level (IAL) for exposures to TCE (trichloroethylene) in indoor air at residences that are, or have the potential to be, impacted by vapor intrusion. An IAL provides the Region guidance on which indoor air contaminant concentrations require action to be taken in order to protect the health of residents. The final Record of Decision (ROD) for the Site will establish cleanup levels for indoor air for the Site. Until such a final cleanup level is established however, an IAL should be set that is health-protective, reasonably achievable with current technology, easily measured and generally consistent with similar decisions at other Superfund sites. An Interim Action Level for TCE of **1 microgram per cubic meter** ($\mu g/m^3$) meets all of these criteria for a residential setting.

1 $\mu g/m^3$ is health protective. There are two health endpoints of primary concern regarding human exposures to TCE: an elevated risk, for persons directly exposed to TCE, of developing cancer and an elevated risk of non-cancer health effects. The most sensitive adverse non-cancer health effects associated with TCE exposure are those on the immune system, the developing fetus and the kidney. Of especial concern is risk of a child being born with a congenital heart defect (CHD) when the mother is exposed during pregnancy. A residential IAL of 1 $\mu g/m^3$ provides adequate protection for both cancer and non-cancer risks.

Cancer Risk: The Excess Lifetime Cancer Risk (ELCR) for exposure to 1 $\mu g/m^3$ TCE in a residential setting is $2x10^{-6}$ (2 in one million). This ELCR is at the extreme lower (less risky) end of the protective risk range which U.S. EPA has established for the Superfund program; the Superfund protective risk range runs from 10^{-6} ("1 in one million") to 10^{-4} ("100 in one million").

Non-cancer Health Effects: The TCE toxicity assessment finalized in September 2011 by the U.S. EPA Integrated Risk Information System (IRIS) program established an inhalation Reference Concentration (RfC) at 2 $\mu g/m^3$ for TCE. RfCs are set to protect against non-cancer health effects caused by inhalation exposure. The TCE RfC is identified to be protective against toxic effects on the immune system and the kidney in exposed individuals, as well as the development of congenital heart defects (CHDs) in children born to mothers exposed to TCE by inhalation during pregnancy. A residential IAL for TCE of 1 $\mu g/m^3$, at one-half of the RfC, provides an adequate margin of exposure below this protective level in situations, such as indoor vapor intrusion, where day-to-day variations in concentrations can be expected.

Outdoor Air: Outdoor air testing to date in the Site area has detected TCE in approximately one-third of samples. With a single exception of one sample of 1.4 ug/m^3 – at a sampling point located on the former Motorola facility itself – all outdoor air TCE detections have been less than 0.6 $\mu g/m^3$. Thus setting a residential indoor air IAL at 1 $\mu g/m^3$ provides a margin of exposure between indoor air and any anticipated contribution from outdoor air.

1 µg/m^3 is reasonably achievable with current technology. Sub-slab depressurization (SSD) systems, as well as other vapor intrusion mitigation measures, are generally effective at lowering indoor air TCE concentrations to levels at or below 1 µg/m^3. SSD systems have been used at various sites within Region 9 and have generally been shown to be effective at lowering indoor air TCE concentrations at or below 1 µg/m^3.

1 µg/m^3 is consistent with Region 9 cleanup decisions for residences at other sites. 1 ug/m^3 is the final cleanup goal for residential indoor air TCE exposures in other regional decisions addressing Superfund sites, such as the MEW Superfund site in Mountain View, CA.

A final cleanup level will be established in the final Record of Decision for Operable Unit 1, and that number may be lower or higher than the IAL discussed here.